Materials & Chemicals

Degradable Polycations Derived from Amino Acid Vinyl Esters

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing hydrophilic and hydrophobic polycationic polymers that degrade under cellular conditions.

Overview

Degradable polyelectrolytes are useful materials for a variety of biological applications, from implant coatings and immunostimulants to therapeutic and gene delivery. Many of these applications rely on polyelectrolytes that perform a specific function and then degrade into nontoxic byproducts, thereby preventing bioaccumulation and toxicity.

Some highly studied synthetic, degradable polyelectrolytes have shown promise yet complex monomer syntheses and harsh polymerization conditions limit the types of chemical functionality that can be introduced into these materials. The utility of poly(beta-amino esters) has been demonstrated for a variety of biomedical applications, but their usage is hampered by synthetic difficulties.

Unlocking the potential of degradable polyelectrolytes for biological applications requires the design of new materials. The materials must derive from a readily accessible monomer platform and enable better chemical control of properties.

The Invention

UW–Madison researchers have developed monomers that can be used to synthesize cationically modified poly(vinyl alcohol) materials with a high degree of control over backbone charge density and hydrophilicity of the resulting material.

Specifically, the researchers have optimized the synthesis and polymerization of a series of *N-Boc*-protected amino acid vinyl ester (BAAVE) monomers derived from *Boc*-protected glycine, alanine, valine and proline. Direct free radical polymerization of the BAAVE monomers with vinyl acetate, followed by a deprotection step, can yield either hydrophilic or hydrophobic cationic materials.

Applications

- Polymers may be useful for complexation and cellular delivery of double-stranded nucleic acids for RNA interference and gene therapies.

Key Benefits

- Designed to be degradable in the cellular milieu, especially under low pH condition found in endosomes
- Designed to be nontoxic

Additional Information

Related Intellectual Property

- View Continuation Patent in PDF format.

Tech Fields

- Materials & Chemicals : Polymers

For current licensing status, please contact Jennifer Gottwald at jennifer@warf.org or 608-960-9854